conductivity of said conductor, and

a surrounding electrical insulation being solid and having

a semiconducting inner layer,

a semiconducting outer layer, and

an intermediate layer of electrically insulating material positioned between said semiconducting inner layer and said semiconducting outer layer.

42
47. A high voltage rotating electric machine according to claim 46, wherein:

said semiconducting inner layer being electrically connected to the conductor so as to be at a same electric potential as said conductor.

43
48. A high voltage rotating electric machine according to claim 46, wherein:

said semiconducting outer layer being connected along a length thereof to a node held at a controlled electric potential.

44
49. A high voltage rotating electric machine according to claim 48, wherein:

said semiconducting outer layer being connected at spaced apart regions to said node.

45
50. A high voltage rotating electric machine according to claim 48, wherein:

said controlled electric potential being earth potential.

46
51. A high voltage rotating electric machine according to claim 46, further comprising:

another winding; wherein

a separate controlled potential being selected for each of said winding and said another

winding.

47
52. A high voltage rotating electric machine according to claim 46, wherein:

at least one of said semiconducting inner layer and said semiconducting outer layer having a substantially equal coefficient of thermal expansion as that of said intermediate layer of electrically insulating material.

48
53. A high voltage rotating electric machine according to claim 46, comprising:

at least one pair of adjacent layers of said inner layer, said intermediate layer, and said outer layer being secured to each other along substantially respective contact surfaces.

49
54. A high voltage rotating electric machine comprising:

at least one magnetic circuit having

a magnetic core; and

a winding having

a cable having

an inner electrical conductor,

a cooling mechanism configured to cool said electrical conductor so as to improve an electrical conductivity of said electrical conductor, and

an outer solid electrical insulation having

a semiconducting inner layer,

a semiconducting outer layer, and

an intermediate layer of electrically insulating material positioned between said semiconducting inner layer and said semiconducting outer layer.

50
55. A high voltage rotating electric machine according to claim 54, further comprising:

a stator,

said at least one magnetic circuit being disposed in the stator.

51
56. A high voltage rotating electric machine according to claim 54, further comprising:

a rotor,

said at least one magnetic circuit being disposed in the rotor.

52
57. A high voltage rotating electric machine according to claim 54, wherein:

said semiconducting outer layer being connected to a node at earth potential at spaced apart regions along a length thereof.

53
58. A high voltage rotating electric machine according to claim 57, further comprising:

slots, and

an end winding region wherein

when said semiconducting outer layer being connected to earth potential, an electric field of said high voltage rotating electric machine at both said slots and said end winding region being near zero.

54
59. A high voltage rotating electric machine according to claim 54, wherein:

said electrical conductor including a superconducting material.

55
60. A high voltage rotating electric machine according to claim 59, wherein:

said cooling mechanism having a central tubular support configured to convey a cryogenic coolant fluid, and

said superconducting material being wound around said central tubular support.

56
61. A high voltage rotating electric machine according to claim 60, wherein:

said cryogenic coolant fluid being liquid nitrogen.

57
62. A high voltage rotating electric machine according to claim 59, wherein:

said superconducting material includes at least one of a high-transition temperature superconducting material and a high-transition temperature HTS material.

58
63. An electric machine according to claim 62, wherein:

said high-transition temperature HTS material includes at least one of a HTS tape and a wire wound around said tubular support.

59
64. A high voltage rotating electric machine according to claim 54, further comprising:

a thermal expansion mechanism provided between said inner electrically conducting material and said electrical insulation.

60
65. A high voltage rotating electric machine according to claim 64, wherein:

said thermal expansion mechanism being an expansion gap.

61
66. An electric machine according to claim 65, wherein:

said thermal expansion gap being a void space.

67. A high voltage rotating electric machine according to claim 65, wherein:

said thermal expansion gap being filled with a compressible material.

63
68. A high voltage rotating electric machine according to claim 67, wherein:

said compressible material being a foamed plastics material.

64
69. A high voltage rotating electric machine according to claim 67, wherein:

said compressible material includes at least one of an electrically conductive material and a semiconductive material.

65
70. A high voltage rotating electric machine according to claim 54, further comprising:

a thermally insulating material being provided outwardly of said electrical conductor.

66
71. A high voltage rotating electric machine according to claim 55, wherein:

said winding being wound in at least one slot formed in said stator, and

each of said at least one slot having

a plurality of substantially circular cylindrical openings extending axially and radially outside one another,

at least one pair of adjacent openings being joined by a narrower waist portion.

67
72. A high voltage rotating electric machine according to claim 56, wherein:

said winding being wound in at least one slot formed in said rotor, and

each of said at least one slot having

a plurality of substantially circular cylindrical openings extending axially and radially outside one another,

at least one pair of adjacent openings being joined by a narrower waist portion.

68
73. A high voltage rotating electric machine according to claim 71, wherein:

a radii of said plurality of substantially circular cylindrical openings decrease in a direction away from a yoke portion of a laminated core of said stator.

69
74. A high voltage rotating electric machine according to claim 72, wherein:

a radii of said plurality of substantially circular cylindrical openings decrease in a direction away from a yoke portion of a laminated core of said stator.

70
75. A high voltage rotating electric machine comprising:

a stator;

a rotor; and

a winding having a coil with

a conductor,

a cooling mechanism configured to cool said conductor so as to improve an electrical conductivity of said conductor,

a layer of electrical insulation surrounding said conductor, and

an equipotential outer layer surrounding said electrical insulation.

71
76. A high voltage rotating electric machine according to claim 75, wherein:

said conductor having a superconducting material.

72
77. A high voltage rotating electric machine according to claim 75, wherein:

said winding being connectable to at least one system voltage level.

73
78. A high voltage rotating electric machine according to claim 77, wherein:

said winding being provided with separate tappings for connection to different system voltage levels.

74
79. A high voltage rotating electric machine according to claim 77, wherein:

a separate winding being provided for connection to each level of said at least one system voltage level.

75
80. A high voltage rotating electric machine according to claim 75, further comprising:

an inner semiconducting layer disposed between said conductor and said intermediate layer of electrical insulation.

76
81. A high voltage rotating electric machine according to claim 80, wherein:

said intermediate layer of electrical insulation being joined to each of said inner semiconducting layer and said equipotential outer layer.

77
82. A high voltage rotating electric machine according to claim 81, wherein:

a strength of an adhesion between said intermediate layer of electrical insulation and each of said inner semiconducting layer and said equipotential outer layer being of a same order of magnitude as an intrinsic strength of a material of said intermediate layer of electrical insulation.

78
83. A high voltage rotating electric machine according to claim 80, wherein:

said inner semiconducting layer, said equipotential outer layer and said intermediate layer of electrical insulation being joined together by extrusion.

79

84. A high voltage rotating electric machine according to claim 83, wherein:

said inner semiconducting layer, said equipotential outer layer and said intermediate layer of electrical insulation being applied together over said conductor through a multi-layer extrusion die.

80

85. A high voltage rotating electric machine according to claim 80, wherein:

said inner semiconducting layer having

a first plastics material having first electrically conductive particles dispersed therein;

said equipotential outer layer having

a second plastics material having second electrically conductive particles dispersed therein; and

said intermediate layer of electrical insulation having a third plastics material.

81

86. A high voltage rotating electric machine according to claim 85, wherein:

each of said first plastics material, said second plastics material and said third plastics material comprising at least one of an ethylene butyl acrylate copolymer rubber, an ethylene-propylene-diene monomer rubber (EPDM), an ethylene-propylene copolymer rubber (EPR), LDPE, HDPE, PP, PB, PMP, XLPE, EPR, and a silicone rubber.

82

87. A high voltage rotating electric machine according to claim 85, wherein:

said first plastics material, said second plastics material and said third plastics material having a substantially same coefficient of thermal expansion.

83

88. A high voltage rotating electric machine according to claim 85, wherein:

said first plastics material, said second plastics material and said third plastics material being a same material.

84

89. A high voltage rotating electric machine according to claim 75, further comprising:

an electric field containing means being for containing an electric field associated with a high voltage on said flexible conductor in excess of 36 kV.

85

90. A high voltage rotating electric machine according to claim 75, further comprising:

an electric field containing means being for handling a power in excess of 0.5 MVA.

86

91. A high voltage rotating electric machine according to claim 75, wherein:

said winding being configured to operate with a 100% overload for a time in an inclusive range of 15 minutes through two hours.

87

92. A high voltage rotating electric machine according to claim 75, wherein:

said winding being configured to be directly connected to a power network via connecting devices and without an intermediate transformer between said high voltage rotating electric machine and said power network.

88

93. A high voltage rotating electric machine according to claim 75, further comprising:

a means for regulating a voltage of said high voltage rotating electric machine by control of a magnetic field flow through said rotor.

89
94. A high voltage rotating electric machine according to claim 92, wherein:

said high voltage rotating electric machine being configured to be operated without a mechanical load and including means for compensating for at least one of inductive load and capacitive load on said power network.

90
95. A high voltage rotating electric machine according to claim 55, wherein:

said winding being wound in at least one slot formed in said stator and including means for confining an electric field, and

each of said at least one slot having

a plurality of substantially circular cylindrical openings extending axially and radially outside one another,

at least one pair of adjacent openings being joined by a narrower waist portion.--

IN THE ABSTRACT OF THE DISCLOSURE

After the last page of the specification, please insert the following Abstract of the Disclosure.